REMARKS

Due to the length of the specification herein, Applicants will cite to the paragraph number of the published patent application (PG Pub) of the present application, i.e., US 2005/0255769, when discussing the application description, rather than to page and line of the specification as filed.

The rejections under 35 U.S.C. § 103(a) of Claims 1-6, 9-12, and 24-25 as unpatentable over US 6,495,292 (Yen) in view of JP 10-326607 (Omae et al), and of Claims 7-8 as unpatentable over Yen in view of Omae et al, and further in view of US 5,389,471 (Kung), are respectfully traversed.

As recited in independent Claim 1, an embodiment of the present invention is a separator, comprising a flexible nonwoven having a porous inorganic coating on and in said nonwoven, and wherein the material of said nonwoven is selected from non-woven, nonelectroconductive polymeric fibers, and wherein said nonwoven has a thickness of less than 30 μm, a porosity of more than 50% and a pore radius distribution, in which at least 50% of the pores have a pore radius from 75 to 150 μm.

Yen discloses a nonwoven battery separator which comprises a nonwoven, the nonwoven formed from a plurality of fibers and at least one high solubility parameter polymer, which polymer forms an encapsulation sheath around the fibers, which encapsulation sheath optionally has pores of about one micron or less and the separator has a surface pore size of at least five microns (column 1, lines 61-67). Yen discloses further that inorganic fillers can be added as part of the encapsulation sheath to improve the wettability of the nonwoven, in a particularly preferable range of between 0 and 50% by weight (column 2, lines 48-56). The encapsulation sheath around the fiber has a thickness of less than five microns (column 3, lines 54-55), and the separator has a thickness of 1 to 50 mils (column 3, line 67), which is equivalent to 25-1250 microns.

The Examiner finds that Yen fails to disclose pore radius distributions in which at least 50% of the pores have a pore radius of from 75 to 150 μm. The Examiner thus relies on Omae et al. Omae et al discloses a battery separator based on a sea-island type composite fiber formed from a polyamide resin-based sea component and a polypropylene-based island component, which composite fiber is mixed with olefin series fibers as a binder so as to form a hybrid fiber, and a cloth web thus obtained is subjected to a water stream entangling process, followed by a sulfonating process, resulting in a battery separator whose maximum pore diameter ranges between 25 and 150 μm (English Abstract).

Finding that Omae et al discloses a nonwoven separator with a pore radius of 75 μm, relying on paragraph [0006] therein (which discloses 25-150 μm, not 75 μm), the Examiner holds that it would have been obvious to one of ordinary skill in the art to employ such a pore radius in the separator of Yen, in order to obtain excellent solution retention and absorbency, relying on paragraph [0004] of Omae et al.

In reply, it is not clear why one skilled in the art would have combined Yen and Omae et al, but even if combined, the result would not be the presently claimed invention. The present invention requires, *inter alia*, that the inorganic coating be porous. Yen does not disclose a porous inorganic coating. Rather, Yen discloses an encapsulation sheath of at least one high solubility parameter polymer, which is optionally porous and which optionally contains an inorganic filler, but the encapsulation sheath cannot be characterized as inorganic. In addition, the Examiner unjustifiably assumes that the excellent solution retention and absorbency disclosed by Omae et al is due to the disclosed maximum pore diameter range therein of between 25 and 150 μm, as opposed to all the other characteristics of their battery separator, as discussed above. In addition, while such a maximum pore diameter range is beneficial for Omae et al, it is not clear that one of ordinary skill in the art would extrapolate

such a pore diameter range to a separator as disclosed by Yen, which does not resemble that of Omae et al.

Thus, a *prima facie* case of obviousness has not been made out. Nevertheless, Applicants have described comparative data in the specification that is probative of non-obviousness, as now discussed.

(Comparative) Example 1 describes a so-called S450PET separator, having an average pore size of 450 nm, a thickness of about 50 μm, and a porosity of about 47% ([0089]-[0091]). Example 3 describes a so-called S850PET separator, having an average pore size of 865 nm, a thickness of 30 μm, and a porosity of about 53% ([0095]-[0097]). (Comparative) Example 4, using the S450PET separator ([0098]-[0099]), and Example 5, using the S850PET separator ([0100]-[0102]), were compared with regard to charging and discharging when used in a lithium ion battery. Using the comparative S450PET separator, on discharging the battery at C (about 3 mA/cm^2), it is found that at these high currents it is impossible to discharge the entire capacity, which is attributable to the internal resistance which is still too high ([0099]). However, with regard to the inventive S850PET separator, on discharging the battery at C (about 3 mA/cm^2), it was found that virtually the entire capacity of the battery can be discharged at these high currents, which is attributable to higher porosity, lower thickness, larger pore size and hence lower internal resistance compared with that of (Comparative) Example 4 ([0102]).

(Comparative) Example 4, although outside the terms of the present claims, is closer than any of the prior art relied on by the Examiner. Compare *Ex parte Humber*, 217 USPQ 265 (Bd. Pat. App. & Inter. 1981) (**copy enclosed**) (comparative data showing the claimed chlorine-containing compounds to be unexpected over various (non-prior art) chlorine-containing isomers was accepted as more probative over prior art, drawn to non-chlorine containing analogs of the claimed compounds, asserted to be closest.)

The Examiner relies on Kung as disclosing oxide particles. However, the oxide particles in Kung are optional inorganic alkali resistant fillers (column 4, line 42ff) in a wettable battery separator for alkaline batteries comprising a porous sheet selected from the group consisting of microporous films, fabrics and synthetic papers, wherein the sheet is saturated with the resin containing one or more carboxyl groups which have been neutralized with a base so as to form a salt wherein the resin is present in an amount of from about 0.0001 to 3% by weight of the sheet (column 2, lines 23-31 and Claim 1). In effect, Kung does not remedy any of the above-discussed deficiencies in the combination of Yen and Omae et al.

For all the above reasons, it is respectfully requested that this rejections be withdrawn.

The provisional rejection of Claims 1-12 and 24-25 on the ground of nonstatutory obviousness-type double patenting over Claims 1-12 of copending Application No. 10/504,144 (copending application) in view of Omae et al, is respectfully traversed. While the Examiner speaks in terms of what the copending application discloses, the only relevant subject matter is the claims thereof. As admitted by the Examiner, the claims of the copending application recite nothing with regard to pore radius distributions in which at least 50% of the pores have a pore radius from 75 to 150 μm. Nor do the claims of the copending application require that their nonwoven thickness be less than 30 μm, since Claim 2 thereof recites a maximum thickness of 80 μm. The disclosures and deficiencies of Omae et al have been discussed above. Omae et al does not suggest that the particular maximum pore diameter range of between 25 and 150 μm disclosed therein would have any applicability in a battery separator such as that claimed herein, which has no resemblance to the battery separator of Omae et al.

In addition, DE 10208277, which is from the same patent family as the copending application, is described in the specification herein, as not especially suitable for use in

lithium high power batteries, since these batteries have to give off large currents within a very short time at virtually constant voltage, and these separators do not meet the performance requirements of such separators for lithium high power batteries because they are insufficiently porous and too thick and hence still insufficiently ion-conductive ([0011]).

For all the above reasons, it is respectfully requested that this provisional rejection be withdrawn.

All of the presently pending and active claims in this application are believed to be in immediate condition for allowance. The Examiner is respectfully requested to rejoin the non-elected process claims, and in the absence of further grounds of rejection, pass this application to issue with all pending claims.

Respectfully submitted,

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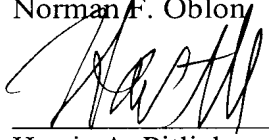

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